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| <p>(54) Title: AN ELEMENT FOR REMOVAL OF SHEARED FIXING MEANS</p>  |                  |   |
| <div style="text-align: center;"> </div>   |                  |   |
| <p>(57) Abstract</p> <p>An engineering element for facilitating extraction of sheared threaded studs and other fastening element. The elements comprises a body having a first face (12), a second face (11) opposite to said first face and a passageway (13) extending between the two faces. The body has an inwardly directed flange (14) at the first face (12) which flange can be welded to the sheared stud. The exterior of the body is hexagonal in shape to receive a spanner by means of which the body can be rotated to unscrew the sheared stud.</p>  |                  |   |

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"AN ELEMENT FOR REMOVAL OF SHEARED FIXING MEANS"

THIS INVENTION relates to an engineering element to facilitate removal of sheared fastening members. The invention has been devised particularly, but not solely, to facilitate extraction of sheared studs.

Where fastening elements such as machine screws, bolts and studs are employed to fasten objects together, the heads of such fastening elements can sometimes shear from the shanks of the fastening elements as a result of the application of excessive torque to the fastening elements or weakness in the fastening elements. In such a situation it is sometimes extremely difficult to remove the shank of a sheared fastening element from the body in which it is embedded without extensive damage to the body.

The present invention seeks to provide a novel element which can be readily fixed to the shank of a sheared fastening element to facilitate removal thereof.

In one form the invention resides in an engineering element for facilitating removal of a sheared fastening element comprising a body having a first face, a second face opposite to said first face and a passageway extending between the said faces, said body being provided with at least one portion extending inwardly at or adjacent said first face.

Preferably, said inwardly extending portion of the body comprises an annular flange.

Preferably, the outer periphery of said body is configured to be engagable with a tool (such as a spanner) for applying torque to or otherwise manipulating the body portion.

In another form the invention resides in a method for removing a sheared fixing element from a body in which it is at least partially embedded comprising the following steps: Placing an engineering element of the type described adjacent to said fixing element such that said first face of the engineering element is adjacent said fixing element; securing said inwardly extending portion of the body of the engineering element to said fixing element; and manipulating said body to remove the sheared fixing element.

Where the fixing element is a threaded fixing element, the step of manipulating said body preferably comprises the application of torque to the body to unscrew the threaded fixing element.

The invention will be better understood by reference to the following description of one specific embodiment thereof as shown in the accompanying drawings in which:-

Fig. 1 is a top plan view of an engineering element;  
Fig. 2 is a side sectional view of the engineering element of Fig. 1;  
Fig. 3 is a side sectional view of the engineering element of Figs. 1 and 2, attached to a sheared fastening means; and  
Fig. 4 is a side sectional view of a sheared fastening means being removed.

The embodiment is directed towards a hollow nut which contains a inwardly directing angular flange spaced inward from one face of the nut. The nut is placed against a sheared stud and spot welded to the stud along the periphery of the inner flange.

The nut 10 comprises a body 10 which has first and second face 11 and 12 and which is hexagonally configured to be gripped by suitably sized spanner. The size of the nut will be dependent on the size of the sheared stud to be removed. The nut is provided with a substantially cylindrical passageway 13 extending throughout the body of the nut. Contiguous to the first face 11 of the nut there is provided an inwardly directing angular flange 14 which extends from the inner wall of the passageway to a position such that the diameter of the inner periphery of the angular flange is less than one half of the diameter of the passageway at the other face.

In use, the nut is positioned on the face of a sheared stud 15 so that the first face of the nut is positioned adjacent to the face of the stud. A suitably sized nut is chosen so that the diameter of the inner periphery of the angular flange is less than the diameter of the sheared stud (see Fig. 3). The nut is fastened to the sheared stud by spot welding the inner periphery of the angular flange to the face of the sheared stud. When the weld 16 has cooled, the stud may be removed by rotating the nut.

It will be appreciated that the nut according to the embodiment can be used to remove sheared fixing elements other than threaded studs and in particular can be used to remove fixing elements which do not incorporate screw threads. In the later case, the nut of this embodiment can be spot welded to the non-threaded fixing element and the fixing element extracted by manipulating the nut such as by twisting and pulling the nut.

Various other changes and modifications may be made to the embodiment described without departing from the present invention. For instance, the flange can be replaced with

any type of inwardly projecting means such as protrudances, the sole requirement being the ability to spot weld or otherwise fix the nut to the face of the sheared fixing means.

THE CLAIMS defining the invention are as follows:-

1. An engineering element for facilitating removal of a sheared fastening element comprising a body having a first face, a second face opposite to said first face and a passageway extending between the said faces, said body being provided with at least one portion extending inwardly at or adjacent said first face.
2. The element of claim 1 wherein the inwardly extending portion comprises an annular flange.
3. The element of claims 1 or 2 wherein the outer periphery of the body is configured for engagement with a tool for manipulating the body.
4. The element of claims 2 or 3 wherein the annular flange extends from the inner wall of the passageway such that the size of the passageway through the inner periphery of the annular flange is less than one half of the diameter of the passageway at the other face.
5. A method for removing a sheared fixing element from a body in which it is at least partially embedded comprising the following steps: Positioning the engineering element at any one of the proceeding claims wherein adjacent to said fixing element such that said first face is adjacent said fixing element; securing said inwardly extending portion of the body to said fixing element; and manipulating said body to remove the sheared fixing element.
6. The method of claim 5 where the inwardly extending portion is welded to the fixing element.

7. The method of claims where the inwardly extending portion is soldered to the fixing element.

8. An engineering element substantially as hereinbefore described with reference to the accompanying drawings.

9. A method for removing a sheared fixing element substantially as hereinbefore described with reference to the accompanying drawings.



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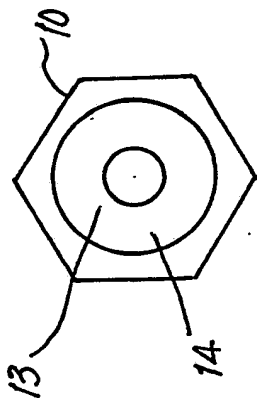


Fig. 1

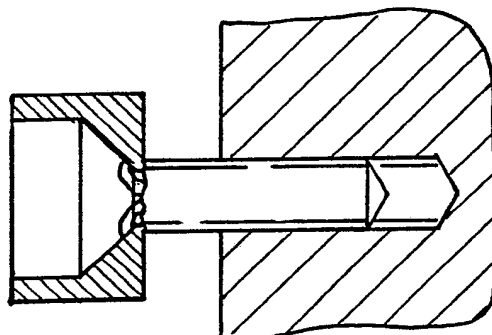


Fig. 4

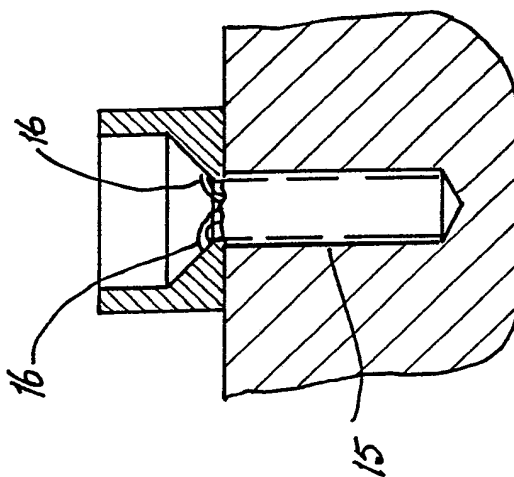


Fig. 3

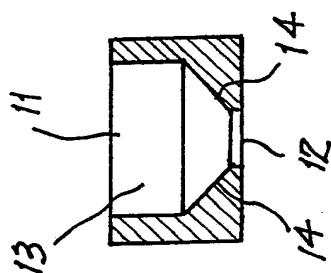


Fig. 2

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/AU 89/00053

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.<sup>4</sup> B25B 27/18

## II. FIELDS SEARCHED

Minimum Documentation Searched \*

| Classification System | Classification Symbols |
|-----------------------|------------------------|
| IPC                   | B25B 27/18             |

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

AU : IPC as above, F16B 37/00

## III. DOCUMENTS CONSIDERED TO BE RELEVANT \*

| Category * | Citation of Document, ** with indication, where appropriate, of the relevant passages ** | Relevant to Claim No. ** |
|------------|--|--------------------------|
| X          | AU,B, 20521/29 (KELSON) 17 June 1930 (17.06.30)  | (1-4)                    |
| X          | AU,B, 18507/48 (137805) (FORGAARD) 22 April 1948 (22.04.48)                              | (1-4)                    |
| X          | AU,A, 73232/87 (ARMSTRONG FASTENINGS LIMITED) 26 November 1987 (26.11.87)                | (1-4)                    |
| A          | US,A, 3727491 (BUCKWALTER) 17 April 1973 (17.04.73)                                      |                          |
| A          | US,A, 1785847 (VALENTINE) 23 December 1930 (23.12.30)                                    |                          |
| A          | US,A, 1683796 (PEARCE) 11 September 1928 (11.09.28)                                      |                          |
| A          | GB,A, 1531494 (PRECISION FOUNDERS & ENGINEERS LIMITED) 8 November 1978 (08.11.78)        |                          |
| A          | GB,A, 320472 (WHELAN) 7 November 1929 (07.11.29)   |                          |

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

3 May 1989 (03.05.89)

Date of Mailing of this International Search Report

12 May 1989 (12.05.89)

International Searching Authority

Australian Patent Office

Signature of Authorized Officer

*D.G. FRY* D.G. FRY

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| NAME           | COUNTRY |
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**ABSTRACT:**

An engineering element for facilitating extraction of sheared threaded studs and other fastening element. The elements

comprises a body having a first face (12), a second face (11) opposite to said first face and a passageway (13) extending between the two faces. The body has an inwardly directed flange (14) at the first face (12) which flange can be welded to the sheared stud. The exterior of the body is hexagonal in shape to receive a spanner by means of which the body can be rotated to unscrew the sheared stud.